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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,454	10/25/2001	Jerome L. Elkind	TI-30785	3557

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EXAMINER	
SEVER, ANDREW T	
ART UNIT	**PAPER NUMBER**
2851	

DATE MAILED: 03/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/053,454	ELKIND ET AL.	
	Examiner	Art Unit	
	Andrew T Sever	2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 February 2004 and 30 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/30/2004 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Herrmann et al. (US 6,194,223.)

Herrmann et al. teaches in figure 1 a surface plasmon resonance sensor, comprising:

A source of polarized light at a selected wavelength (laser 2 produces the light and polarizer 6 polarizes the light);

A surface plasmon layer, comprising:

A resonance film (26), formed of a selected material to a selected thickness so that the polarized light from the source establishes surface plasmon resonance at a surface of the resonance film (inherent in a plasmon sensor and taught in column 4 lines 15-16), the surface plasmon resonance producing an evanescent wave extending away from the surface of the resonance film over a sensing range; and

A hard protective film overlying the surface of the resonance film, and having a thickness that is substantially less than the sensing range (Although this is not shown in figure 1 or any other figure, it is taught as an alternate embodiment in column 2 lines 27-42, specifically Herrmann teaches the well known combination of a metal/metal oxide combination which in lines 38-42 comprise of gold or silver for the metal layer (the plasmon resonance layer) and the use of one of a group of metal oxide layers);

A light transmissive medium disposed between the source and the surface plasmon layer (8 which is taught to be a prism and in column 4 lines 9-10 is taught to be glass); and

A photodetector array, for detecting intensity of polarized light reflected from the resonance film (14, which is taught to be a photodiode, it should be noted the 16 is also a photo detector array specifically a photomultiplier, however this is specified to be provided for the purpose of detecting fluorescence which is beyond the scope of the applicant's claimed invention).

With regards to applicant's claim 3:

Herrmann teaches that the resonance film comprises gold. (See column 2 line 40 which teaches that the noble metal is preferably gold or silver and also see column 4 line 12 which teaches that in the example shown in figure 1 the metal layer is specifically a 50 nm thick gold layer.)

With regards to applicant's claim 7:

The source comprises:

A light-emitting diode (column 4 line 5-7 teaches that the light source is a laser diode a type of light emitting diode); and

A polarizing element disposed between the light-emitting diode and the surface plasmon layer (see figure 1 which clearly shown the polarizing element 6 is between the laser diode 2 and the surface plasmon layer 26).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2, 10, and 14 rejected under 35 U.S.C. 103(a) as being unpatentable over Herrmann et al. (US 6,194,223) as applied to claim1, 3, and 7 above, and further in view of Molly (US 5,770,462.)

As described in more detail above, Herrmann et al. teaches a surface plasmon resonance sensor comprising a source of polarized light, a surface plasmon layer, a light transmissive medium disposed between the source and the surface plasmon layer, and a photodetector array. The surface plasmon layer comprises a resonance film formed of gold at a selected thickness so that the polarized light from the source establishes surface plasmon resonance at a surface of the resonance film. Herrmann teaches that the sensor's hard protective film consists essentially of a material selected from the group consisting of silicon carbide, diamond-like carbon, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, aluminum oxide, aluminum nitride, beryllium oxide, and tantalum oxide (see column 2 lines 41 and 42 which list the following oxides: silicon dioxide, titanium oxide, aluminum oxide).

Herrmann does not specifically teach that the hard protective film is selected from the group consisting of silicon carbide, diamond-like carbon, silicon nitride, titanium

nitride, aluminum nitride, beryllium oxide, and tantalum oxide. Molloy teaches an analytical apparatus which includes a plasmon resonance sensor (column 1 lines 5-15). Molloy teaches that the cavity layer where the plasmon resonance reaction is to occur is lined with a thin-film of dielectric material which suitable materials include: silicon nitride and tantalum oxide as well as those materials taught by Herrmann for the hard protective layer such as aluminum oxide and silicon dioxide (column 4 lines 1-18.) Given Molloy's teaching that silicon nitride and tantalum oxide are interchangeable with Hermann's aluminum oxide and silicon dioxide and applicant's own admission in applicant's specification of their interchangeability (they are all members of a Markush group see page 10 of applicant's specification as originally filed) it would have been obvious to one of ordinary skill in the art at the time the invention was made to exchange the aluminum oxide and/or silicon dioxide of Herrmann for the silicon nitride and/or tantalum oxide taught by Molloy when the specific chemical/material properties of those alloys would be preferable for a specific application (for example if a sample to be tested improperly strongly reacts with aluminum oxide but not silicon nitride it would be obvious to use a sensor that has the silicon nitride instead of the aluminum oxide as is well known by those with ordinary skill in the art.)

With regards to applicant's claim 10:

Herrmann teaches that the resonance film comprises gold. (See column 2 line 40 which teaches that the noble metal is preferably gold or silver and also see column 4 line 12 which teaches that in the example shown in figure 1 the metal layer is specifically a 50 nm thick gold layer.)

With regards to applicant's claim 14:

The source comprises:

A light-emitting diode (column 4 line 5-7 teaches that the light source is a laser diode a type of light emitting diode); and

A polarizing element disposed between the light-emitting diode and the surface plasmon layer (see figure 1 which clearly shown the polarizing element 6 is between the laser diode 2 and the surface plasmon layer 26).

6. Claims 4-6, 8, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herrmann et al. (US 6,194223) as applied to claims 1, 3, and 7 above, and further in view of Melendez et al. (US 5,912,456).

As described in more detail above, Herrmann et al. teaches a surface plasmon resonance sensor comprising a source of polarized light, a surface plasmon layer, a light transmissive medium disposed between the source and the surface plasmon layer, and a photodetector array. The surface plasmon layer comprises a resonance film formed of gold at a selected thickness so that the polarized light from the source establishes surface plasmon resonance at a surface of the resonance film. The surface plasmon layer further

is covered by a hard protective film formed of a material selected from the group consisting of silicon carbide, diamond-like carbon, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, aluminum oxide, aluminum nitride, beryllium oxide, and tantalum oxide (specifically silicon dioxide, titanium oxide, and aluminum oxide.)

Herrmann, however does not teach an intermediate mirror positioned relative to the photodetector array so as to reflect, to the photodetector array, polarized light reflected from the resonance film, Herrmann also does not teach enclosing the sensor in a housing. Melendez et al. teaches in figure 2 a plasmon sensor, which comprises a light source (42) a polarizer (48), a resonance film (54), and a photodetector array (58). Melendez's plasmon sensor is enclosed in a housing (52). Melendez further teaches the use of a mirror to redirect the polarized light reflected from the resonance film towards the photodetector array (58). Using mirrors to redirect light beams is well known in the optical arts and as explained by Melendez in column 4 lines 50-65 it is desirable to have the light beam strike the detector array at an angle close to 90 degrees while limiting the size and mechanical complexity of the plasmon sensor (see column 1 lines 15-60 of Melendez.) Since it is well known to redirect light beams with mirrors and since as taught by Melendez the housing structure shown in Melendez's figure 2 requires less alignment and is mechanically simpler then the prior art prism method taught by Herrmann, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enclose Herrmann's plasmon resonance sensor which has a hard protective film overlying the surface of the resonance film in a housing and use a mirror

to redirect the beam as is taught by Melendez in order to make a more sturdy mechanically simpler plasmon resonance sensor.

With regards to applicant's claims 5, 6, 8 :

As shown in figure 2 of Melendez the housing of Herrmann in view of Melendez is disposed over the source and the photodetector array which are physically mounted in a substrate with a plurality of leads as is claimed by applicant's claim 8. As taught by Melendez in column 4 line 66 to column 5 line 10 it is desirable to have the surface plasmon layer and intermediate mirror preferably formed on an exterior surface of the housing. Although Herrmann's plasmon layer differs from Melendez's (namely the addition of the hard layer), it would still be obvious and beneficial to place it on the exterior surface of the housing, since placing it on the interior of the housing would require opening the device to place a sample for testing, which one with ordinary skill in the art at the time the invention was made would recognize could introduce containments such as dust as well as cause mechanical jarring which would negatively affect the quality of the measurements. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to mount the surface plasmon layer and intermediate mirror to the surface of the housing as is claimed in applicant's claims 5 and 6.

With regards to applicant's claim 16:

Hermann teaches in figure 1 an output device for outputting an indication based upon an angle at which polarized light is absorbed by a sample medium dispensed into the opening. (PC 24 inherently outputs the angle among other things.)

7. Claims 11-13, 15, and 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herrmann in view of Molloy as applied to claims 2 and 9 above, and further in view of Melendez et al. (US 5,912,456).

As described in more detail above, Herrmann in view of Molloy teaches a surface plasmon resonance sensor comprising a source of polarized light, a surface plasmon layer, a light transmissive medium disposed between the source and the surface plasmon layer, and a photodetector array. The surface plasmon layer comprises a resonance film formed of gold at a selected thickness so that the polarized light from the source establishes surface plasmon resonance at a surface of the resonance film. The surface plasmon layer further is covered by a hard protective film formed of a material selected from the group consisting of silicon carbide, diamond-like carbon, silicon dioxide, silicon nitride, titanium oxide, titanium nitride, aluminum oxide, aluminum nitride, beryllium oxide, and tantalum oxide (specifically silicon nitride, and tantalum oxide as well as silicon dioxide, titanium oxide, and aluminum oxide.)

Herrmann in view of Molloy however does not teach an intermediate mirror positioned relative to the photodetector array so as to reflect, to the photodetector array, polarized light reflected from the resonance film, Herrmann in view of Molloy also does

not teach enclosing the sensor in a housing. Melendez et al. teaches in figure 2 a plasmon sensor, which comprises a light source (42) a polarizer (48), a resonance film (54), and a photodetector array (58). Melendez's plasmon sensor is enclosed in a housing (52). Melendez further teaches the use of a mirror to redirect the polarized light reflected from the resonance film towards the photodetector array (58). Using mirrors to redirect light beams is well known in the optical arts and as explained by Melendez in column 4 lines 50-65 it is desirable to have the light beam strike the detector array at an angle close to 90 degrees while limiting the size and mechanical complexity of the plasmon sensor (see column 1 lines 15-60 of Melendez.) Since it is well known to redirect light beams with mirrors and since as taught by Melendez the housing structure shown in Melendez's figure 2 requires less alignment and is mechanically simpler then the prior art prism method taught by Herrmann in view of Molloy, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enclose Herrmann in view of Molloy's plasmon resonance sensor which has a hard protective film overlying the surface of the resonance film in a housing and use a mirror to redirect the beam as is taught by Melendez in order to make a more sturdy mechanically simpler plasmon resonance sensor.

With regards to applicant's claims 12, 13, and 15:

As shown in figure 2 of Melendez the housing of Herrmann in view of Molloy and further in view of Melendez is disposed over the source and the photodetector array, which are physically mounted in a substrate with a plurality of leads as is claimed by applicant's claim 15. As taught by Melendez in column 4 line 66 to column 5 line 10 it is desirable to have the surface plasmon layer and intermediate mirror preferably formed on an exterior surface of the housing. Although Herrmann in view of Molloy's plasmon layer differs from Melendez's (namely the addition of the hard layer), it would still be obvious and beneficial to place it on the exterior surface of the housing, since placing it on the interior of the housing would require opening the device to place a sample for testing, which one with ordinary skill in the art at the time the invention was made would recognize could introduce containments such as dust as well as cause mechanical jarring which would negatively affect the quality of the measurements. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to mount the surface plasmon layer and intermediate mirror to the surface of the housing.

Response to Arguments

8. Applicant's arguments with respect to claims 2, 9-15, and 17 have been considered but are moot in view of the new ground(s) of rejection.

9. Applicant's arguments filed 1/30/2004 have been fully considered but they are not persuasive.

Applicant continues to argue that the Herrmann patent does not teach the hard protective film. Applicant argues that what the office is saying is the hard protective film is rather an attachment layer. As was stated in the final rejection mailed on 11/13/2003, this is irrelevant, as applicant does not claim a hard protective film that is not an attachment layer. Applicant only claims 2 films: the resonance film and a hard protective film overlying the surface of the resonance film.

Herrmann teaches two films also, whether Hermann's hard protective film has an additional use as a means to enable ligand attachment via standard silanization processes or not is irrelevant. Given that Herrmann teaches that the hard protective layer is made of a material selected from one of 3 of the same materials that the applicant specifies the hard protective layer is made of, one of ordinary skill in the art would have to conclude that Herrmann teaches the same film as the applicant or else applicant's disclosure is not fully enabled since applicant has failed to specify a reason why their identical film is not a means to enable ligand attachment via standard silanization processes as applicant alleges Herrmann's is.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,329,209 to Wagner et al. teaches in column 14 lines 15-47 that for various applications with biological testing using SPR that materials included in amended claim 2 are interchangeable.

US 6,529,277 to Weitekamp teaches in column 9 lines 5-19 using silicon nitride at a thickness of few tens of nanometers to protect a gold particle in a hostile environment.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew T Sever whose telephone number is 571-272-2128. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russell Adams can be reached on 571-272-2112. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AS

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